Wings and Fuselage — Rudder
ARGENTINA

Wings — Rudder
BELGIUM

Wings and Fuselage — Rudder
BOLIVIA

Wings — Army — Rudder — Wings — Navy — Rudder
BRAZIL

Wings—Upper Surface — Wings—Under Surface — Fuselage — Fin
BRITISH EMPIRE

Wings — Rudder
CHILE

Wings — No rudder marking
CHINA

Wings — Rudder
COLOMBIA

Wings — Rudder
CUBA

Wings — Rudder
ECUADOR

Wings — Rudder
YUGOSLAVIA

Wings — Rudder
VENEZUELA

Wings — Rudder
URUGUAY

Wings — Rudder
TURKEY

Wings — Rudder
THAILAND

Wings — Rudder
SWITZERLAND

Wings and Fuselage — No rudder marking
SWEDEN

Wings — Rudder
SPAIN

Wings — Rudder
SALVADOR

Wings and Fuselage — No rudder marking
RUSSIA

Wings — Rudder
RUMANIA

Wings — Rudder
PORTUGAL

Wings and Fuselage — Rudder
POLAND

Wings — Rudder
PERU

Wings — Fuselage
PARAGUAY

Wings — Rudder
NORWAY

Wings — Rudder
NICARAGUA

Wings and Fuselage — No rudder marking
EGYPT

Wings — Fuselage
EIRE

Wings and Fuselage — Rudder
FINLAND

Wings and Fuselage — Rudder
FIGHTING FRANCE

Wings and Fuselage — Rudder
FRANCE

Wings and Fuselage — Rudder
GERMANY

Wings — Rudder
GREECE

Wings — Rudder
GUATEMALA

Wing Tips — Rudder
HONDURAS

Wings — Rudder
HUNGARY

Wings — Rudder
IRAN

Wings and Fuselage — Rudder
IRAQ

Wings — Rudder
ITALY

Wings and Fuselage on Navy
Wings only on Army
JAPAN

Wings and Fuselage
LATVIA

Wings — Rudder
LITHUANIA

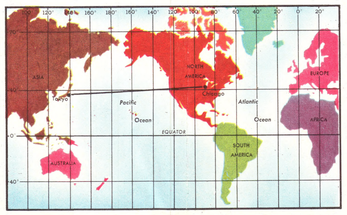
Wings and Fuselage — Rudder
NETHERLANDS

Wings — Rudder
MEXICO

Army — Marines — Navy
Wings and Fuselage
No rudder marking
UNITED STATES

Any flat map made to picture the whole surface of the world has to be "fudged" somewhere, because it is impossible to make the skin of a sphere, such as a tennis ball, lie completely flat no matter how you cut it, unless you do some stretching and squeezing. This distortion is all right, so long as one understands where it is and how much it is.

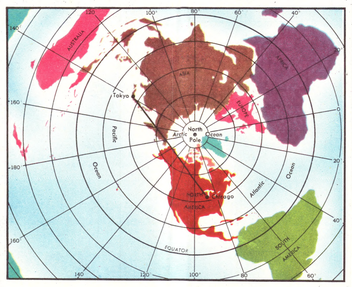
Most people know the Mercator projection of the world best. It is made by slitting the surface of the globe like an orange, flattening out the segments, and then stretching out the extreme north and south portions to make a continuous map.



This kind of map does tell us accurately that Tokio is almost straight west of Chicago, but it is very misleading as to the *direction and distance* one would fly to get from Chicago to Tokio the shortest way. The next picture shows why.

To find the shortest distance between two places on the globe, you stretch a string *tight* between the two points. The line it makes on the globe is what navigators call the Great Circle route between the two places. Ships sail close to Great Circle routes on the ocean. But planes can fly Great Circle routes over both land and sea.

The Great Circle route from Chicago to Tokio is "up" over Canada and Alaska, as you see from this illustration. In the air age we are entering it is important to have a flat map which will show true flying directions more accurately than the Mercator type of map. We are all going to have to get used to thinking that, to an air pilot, the way to start to Moscow from any place in the U. S. A. is more nearly north than east or west. Distances get shorter, too, when you fly *across*, instead of sailing *around*.



The big map in the center of this sheet is a new kind of projection of the entire surface of the earth which has been developed to give a more nearly accurate conception of air directions and distances. It is called an Azimuthal Equidistant Projection, or, more simply, a North Polar Projection.

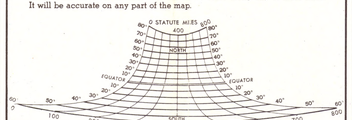
It is made by cutting the segments of the surface as in the top illustration, but arranging them as shown at right: and then stretching and squeezing them into a continuous map, with the North Pole at the center.

This kind of map shows the whole world continuously, and it has the big advantage that straight lines between two points in the northern hemisphere (the central part of the map) lie quite close to the actual Great Circle route. Compare the Chicago-Tokio line on this map with the Chicago-Tokio route on the globe.

Now you see why this is the kind of world map you must learn to think with in the air age.

STATUTE 0 — 500 — 1000 MILES

LATITUDE SCALE: Latitude is the North-South measure of distance. On this Polar Projection you will find a series of lines radiating like spokes of a wheel from the North Pole. Every one of these lines runs south. To measure north-south distances in miles, use the above scale along any of these lines. It will be accurate on any part of the map.



LONGITUDE SCALE: Longitude is the East-West measure of distance. On this map the circles are the east-west lines. To measure distances in this direction, first identify the circle by its number, and then select the proper mileage scale from the diagram above. Note that in the area between the Equator and the North Pole, there is little difference in the scale, i.e., there is little distortion of shape or size on the map. But south of the equator the scale increases rapidly, the farther south you go. Australia, for instance, is greatly stretched from its true shape, east and west.

PUBLISHED BY ALCOA MAP DEPT. P. O. BOX 52, NEW YORK, N. Y.

Indian Ocean
Pacific Ocean
Atlantic Ocean
Arctic Ocean
AUSTRALIA
CHINA
INDIA
UNION OF SOVIET SOCIALIST REPUBLICS
EUROPE
AFRICA
CANADA
UNITED STATES
MEXICO
SOUTH AMERICA
BRAZIL
ARGENTINA
EQUATOR
ANTARCTICA
Great Australian Bight
Coral Sea
Arafura Sea
Timor Sea
South China Sea
Bay of Bengal
Arabian Sea
Gulf of Mexico
Caribbean Sea
Mediterranean
Black Sea
Caspian Sea
Red Sea
Persian Gulf
Hudson Bay
Weddell Sea
Mozambique Channel
Sea of Okhotsk
Sea of Japan
North Sea
Baffin Bay
Greenland Sea
Barents Sea
Norwegian Sea
Tasman Sea
Great Barrier Reef
Great Australian Bight
NEW ZEALAND
JAPAN
PHILIPPINES
INDONESIA
NETHERLANDS EAST INDIES
MALAYA
SIAM
FRENCH INDO-CHINA
BURMA
PAKISTAN
AFGHANISTAN
IRAN
IRAQ
SAUDI ARABIA
ITALIAN SOMALILAND
BELGIAN CONGO
FRENCH EQUATORIAL AFRICA
ANGOLA
MOZAMBIQUE
SOUTHERN RHODESIA
UNION OF SOUTH AFRICA
MADAGASCAR
GREENLAND
ICELAND
NORWAY
SWEDEN
FINLAND
POLAND
GERMANY
FRANCE
SPAIN
PORTUGAL
ITALY
GREECE
TURKEY
EGYPT
LIBYA
ALGERIA
MOROCCO
NIGERIA
GOLD COAST
SENEGAL
BRITISH GUIANA
DUTCH GUIANA
FRENCH GUIANA
VENEZUELA
COLOMBIA
ECUADOR
PERU
CHILE
BOLIVIA
PARAGUAY
URUGUAY
Hawaii
Alaska
Panama Canal
Gibraltar
Suez Canal
Cape Horn
Cape of Good Hope
Cape Verde Is. (Port.)
Azores (Port.)
Canary Is. (Spain)
Madeira (Port.)
Falkland Is. (Br.)
Ascension (Br.)
St. Helena (Br.)
Trinidad (Brazil)
St. Paul Rocks (Brazil)
Fernando de Noronha (Brazil)
Prince Edward (Br.)
Rodriguez (Br.)
Mauritius (Br.)
Reunion (Fr.)
Chagos Archipelago (Br.)
Seychelles (Br.)
Comoro Is. (Fr.)
Tromelin (Fr.)
Amsterdam (Fr.)
St. Paul (Fr.)
Kerguelen (Fr.)
Heard (Aust.)
Macquarie (Aust.)
Auckland Is. (N. Z.)
Campbell (N. Z.)
Chatham Is. (N. Z.)
Kermadec Is. (N. Z.)
Norfolk (Br.)
Lord Howe (Aust.)
New Caledonia (Fr.)
Loyalty Is. (Fr.)
Fiji Is. (Br.)
Tonga (Br.)
Samoan Islands (U. S.)
Cook Is. (N. Z.)
Society Is. (Fr.)
Marquesas Islands (Fr.)
Tuamotu (Fr.)
Easter (Chile)
Juan Fernández (Chile)
Galapagos (Ec.)
Clipperton (France)
Revillagigedo (Mex.)
Bermuda (Br.)
Bahama Is. (Br.)
Jamaica (Br.)
Haiti
Dominican Republic
Puerto Rico
Virgin Is. (U. S.)
Leeward Is. (Br.)
Windward Is. (Br.)
Barbados (Br.)
Trinidad (Br.)
Curaçao (Neth.)
Aruba (Neth.)
Netherlands Antilles (Neth.)
Guadeloupe (Fr.)
Martinique (Fr.)
Dominica (Br.)
St. Lucia (Br.)
St. Vincent (Br.)
Grenada (Br.)
Tobago (Br.)
Guiana (Br.)
Guiana (Neth.)
Guiana (Fr.)
Fernando Po (Spain)
São Tomé (Port.)
Liberia
Sierra Leone
Gambia
Portuguese Guinea
Spanish Morocco
Tangier
Algeria
Tunisia
Libya
Egypt
Sudan
Eritrea
Kenya
Uganda
Tanganyika
Nyasaland
Northern Rhodesia
Southern Rhodesia
Bechuanaland
South West Africa
Union of South Africa
Basutoland
Swaziland
Portuguese East Africa
Portuguese West Africa
Belgian Congo
French Equatorial Africa
Italian Somaliland
Aden
Saudi Arabia
Kuwait (Br.)
Bahrein (Br.)
Qatar (Br.)
Muscat
Trucial Oman
Yemen
Afghanistan
Baluchistan
Sinkiang
Tibet
Mongolia
Manchuria
Korea
Formosa
Hainan
Hong Kong (Br.)
Macao (Port.)
Portuguese Timor
Netherlands East Indies
Borneo
Celebes
Sumatra
Java
Malaya
Siam
French Indo-China
Burma
Andaman Is. (India)
Nicobar Is. (India)
Ceylon
Maldive Is. (Br.)
Laccadive Is. (India)
Madras
Bombay
Calcutta
Karachi
Delhi
Lahore
Rangoon
Singapore
Saigon
Hanoi
Bangkok
Manila
Hong Kong
Shanghai
Nanking
Chungking
Peiping
Mukden
Harbin
Vladivostok
Irkutsk
Yakutsk
Omsk
Novosibirsk
Tashkent
Stalingrad
Moscow
Leningrad
Murmansk
Archangel
Kiev
Odessa
Warsaw
Berlin
Paris
London
Dublin
Rome
Madrid
Lisbon
Athens
Istanbul
Ankara
Beirut
Damascus
Jerusalem
Cairo
Alexandria
Tripoli
Benghazi
Tobruk
Algiers
Oran
Casablanca
Dakar
Monrovia
Freetown
Bathurst
Lagos
Accra
Takoradi
Leopoldville
Elisabethville
Lourenço Marques
Durban
Capetown
Walvis Bay
Luderitz
Bangui
Fort Lamy
Khartoum
Addis Ababa
Asmara
Mogadiscio
Nairobi
Kampala
Dar es Salaam
Zanzibar
Beira
Salisbury
Broken Hill
Lusaka
Ndola
Blantyre
Tananarive
Diego Suarez
Port Louis
Réunion
Mauritius
Seychelles
Comoro Is.
Tromelin
Amsterdam
St. Paul
Kerguelen
Heard
Macquarie
Auckland Is.
Campbell
Chatham Is.
Kermadec Is.
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Samoan Islands
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Society Is.
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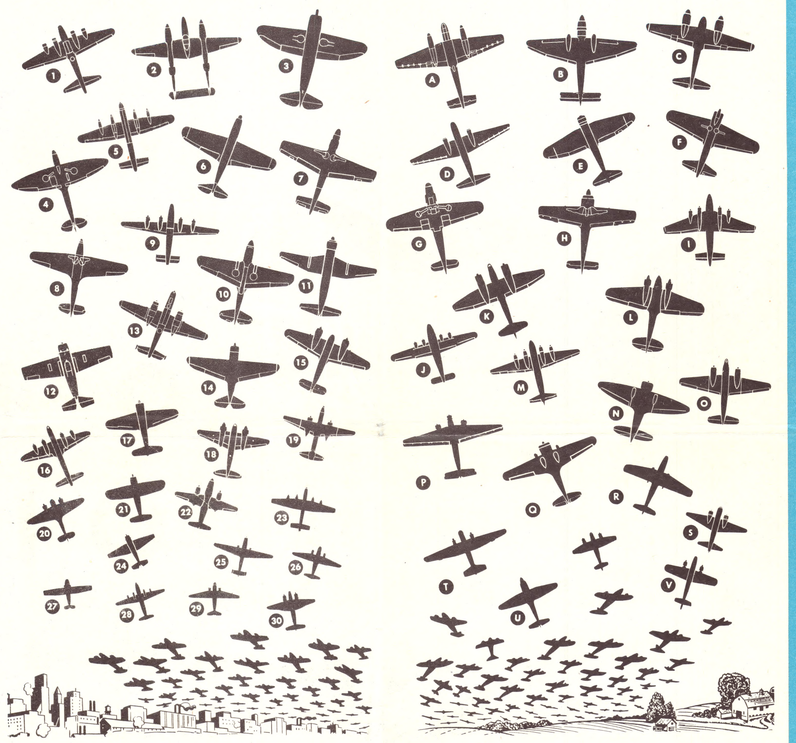
Guadeloupe
Martinique
Dominica
St. Lucia
St. Vincent
Grenada
Tobago
Guiana
Fernando Po
São Tomé
Liberia
Sierra Leone
Gambia
Portuguese Guinea
Spanish Morocco
Tangier
Algeria
Tunisia
Libya
Egypt
Sudan
Eritrea
Kenya
Uganda
Tanganyika
Nyasaland
Northern Rhodesia
Southern Rhodesia
Bechuanaland
South West Africa
Union of South Africa
Basutoland
Swaziland
Portuguese East Africa
Portuguese West Africa
Belgian Congo
French Equatorial Africa
Italian Somaliland
Aden
Saudi Arabia
Kuwait
Bahrein
Qatar
Muscat
Trucial Oman
Yemen
Afghanistan
Baluchistan
Sinkiang
Tibet
Mongolia
Manchuria
Korea
Formosa
Hainan
Hong Kong
Macao
Portuguese Timor
Netherlands East Indies
Borneo
Celebes
Sumatra
Java
Malaya
Siam
French Indo-China
Burma
Andaman Is.
Nicobar Is.
Ceylon
Maldive Is.
Laccadive Is.

ARMY

AIRCRAFT SQUADRON INSIGNIA

NAVY

SPOTTING AIRPLANES



FIGHTING PLANES OF THE UNITED NATIONS

ENEMY PLANES

Planes not drawn to relative scale. Silhouettes courtesy Aviation Magazine and official sources.

INDEX TO FRIENDLY PLANES:

1—B-17E-"FORTRESS"
2—P-38-"LIGHTNING"
3—P-47-"THUNDERBOLT"
4—SPITFIRE
5—LANCASTER
6—P-39-"AIRACOBRA"
7—P-51-"MUSTANG" (Br.)-"APACHE" (U. S.)
8—HURRICANE
9—B-24-"LIBERATOR"
10—P-40F-"WARHAWK"
11—A-31V-"VENGEANCE"
12—F4F-"WILDCAT"
13—B-25-"MITCHELL"
14—SB2C-"HELLDIVER"
15—BEAUFIGHTER
16—STIRLING
17—SBD-"DAUNTLESS"
18—MOSQUITO
19—A-20-"HAVOC-BOSTON"
20—BLENHEIM
21—F4U-"CORSAIR"
22—B-26-"MARAUDER"
23—HALIFAX
24—TBF-"AVENGER"
25—PBM-"MARINER"
26—C-46-"COMMANDO"
27—PBY-"CATALINA"
28—C-54-"SKYMASTER"-DC-4
29—C-47-"SKYTRAIN"-DC-3
30—B-34-"VENTURA"

1 **GROUND OBSERVATION PROCEDURE:** Observer spots aircraft. Noting type of planes, number, height and direction of flight, he phones operator and says, "ARMY FLASH". Operator connects him with . . .

2 **FILTER CENTER** —to which he reports his information. When FILTER CENTER has received several confirming reports they transmit their report to . . .

3 **INFORMATION CENTER** —where a large map combining areas of several Filter Centers is used to plot developments. If the flight is not identified as friendly the Fighter Command Controller calls out the . . .

4 **FIGHTER PLANES** —directing them to contact the enemy airplanes. Meanwhile the Civil Air Raid Warning Officer notes the areas threatened, and flashes a yellow, blue or red alarm to . . .

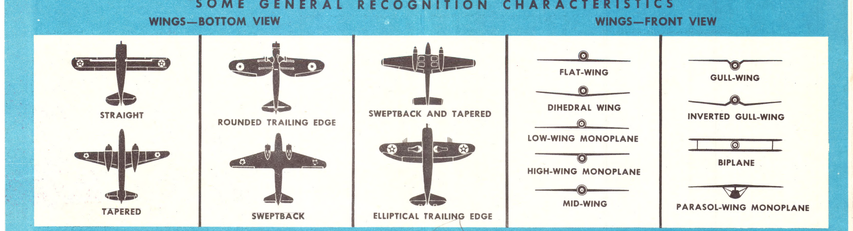
5 **WARNING DISTRICT CENTER** —where the Civilian Defense is called into action. Workers of the Civilian Defense telephone warnings to . . .

6 **CONTROL CENTERS** —where the Commander of the Citizens Defense Corps, after the alert is sounded (by sirens or other warning devices) directs defense of his area.

INDEX TO ENEMY PLANES:

A—ME 110-"MESSERSCHMITT"
B—JU 87 (STUKA)-"JUNKERS"
C—ME 210-"MESSERSCHMITT"
D—TYPE 96 BOMBER-"MITSUBISHI"
E—TYPE 99 FIGHTER-"AICHI"
F—ZERO-"MITSUBISHI"
G—ME 109F-"MESSERSCHMITT"
H—FW-190-"FOCKE-WULF"
I—JU-90-"JUNKERS"
J—TYPE 97-FLYING BOAT-"KAWANISHI"
K—JU 88-"JUNKERS"
L—HE 111 K-"HEINKEL"
M—FW 200K-"KURIER FOCKE-WULF"
N—TYPE 96 FIGHTER-"MITSUBISHI"
O—TYPE 97 BOMBER-"MITSUBISHI"
P—JU 52-"JUNKERS"
Q—TYPE 97 FIGHTER-"MITSUBISHI"
R—DO 26K-"DORNIER"
S—TYPE ONE BOMBER (JAPANESE)
T—HE 177-"HEINKEL"
U—HE-113-"HEINKEL"
V—DO 217E-"DORNIER"

SOME GENERAL RECOGNITION CHARACTERISTICS



GENERAL COMMANDS

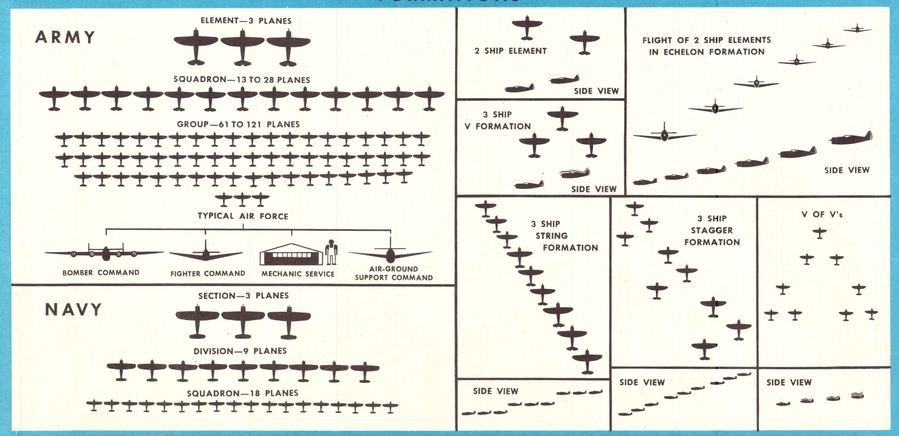
THE FOUR ARMIES

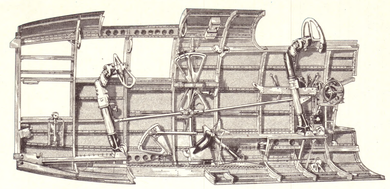
ARMY CORPS

DIVISIONS

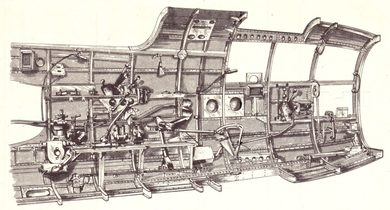
© Aluminum Company of America. All data included were the most complete available on October 15, 1943

FORMATIONS



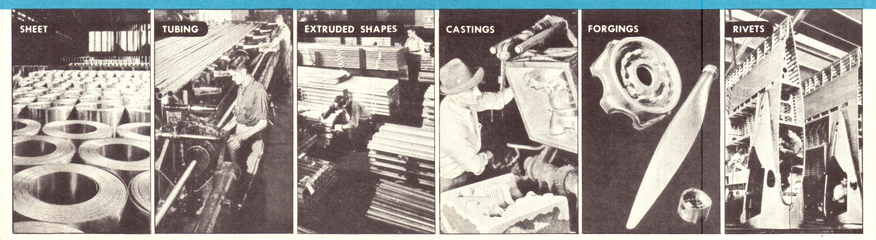


CONSTRUCTION DETAILS of the right-hand side of the interior of the fuselage of a typical U. S. Bomber. Great strength with lightness is obtained by making the frame of strong alloys of Alcoa Aluminum. The skin is not just a smooth covering which is "tacked on". It, too, is made of a very strong Alcoa Aluminum Alloy and takes its share of structural stresses.



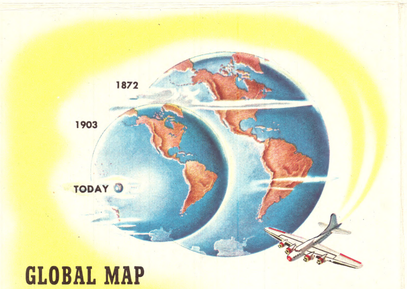
LEFT SIDE of the same fuselage. Included here are most of the forms in which Alcoa Aluminum is used in an airplane: sheet, extruded shapes, rivets, tubing, castings, and forgings. Seventy-five per cent of the total weight of an airplane is aluminum, because it best combines the lightness and strength, the workability, and the dependability that are needed.

THE KINDS OF ALUMINUM IT TAKES TO MAKE AN AIRPLANE



HOW ALUMINUM IS MADE

1. The ore, Bauxite, is mined in shafts or is stripped when near the surface. 2. After careful cleaning, the ore is chemically treated to obtain Alumina (Al_2O_3) a white powder. 3. Meantime huge amounts of electricity are made available from water-power projects like this. 4. The alumina then goes into an electrolytic cell where the electricity frees the raw molten aluminum. It takes nine pounds of raw material and ten to twelve kilowatt hours of electricity to get one pound of aluminum this far. 5. Then the metal is alloyed and may be rolled into sheet as in this mill which rolls a continuous sheet a quarter of a mile long. 6. Or it may go into the forge shop to be hammered into a propeller. These are only two of the many fabricated forms of Alcoa Aluminum.



GLOBAL MAP

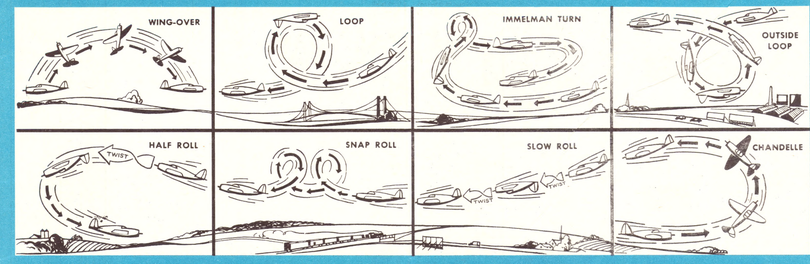
for **GLOBAL WAR** *and* **GLOBAL PEACE**

In 1872 it took 80 days to circle the world. In 1903, 54 days. In 1938, Howard Hughes flew 'round the world in 3 days, 19 hours, 8 minutes, 10 seconds. The three globes show how the airplane has shrunk our world.

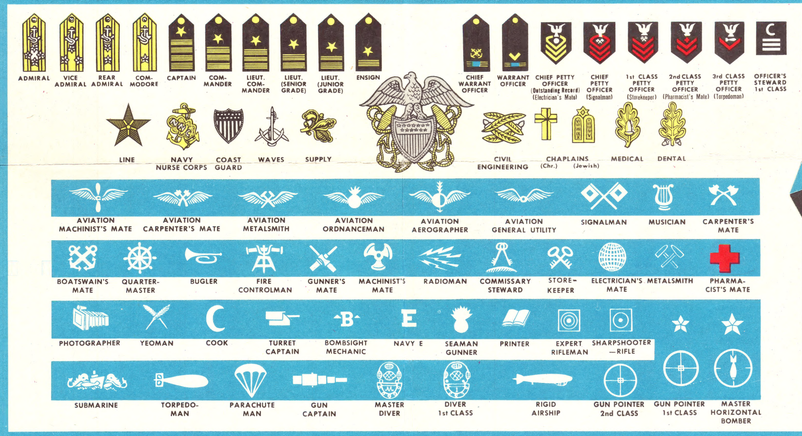
We now have to look at the world with new eyes . . . and new thinking, too.

ALCOA ALUMINUM

STUNTING

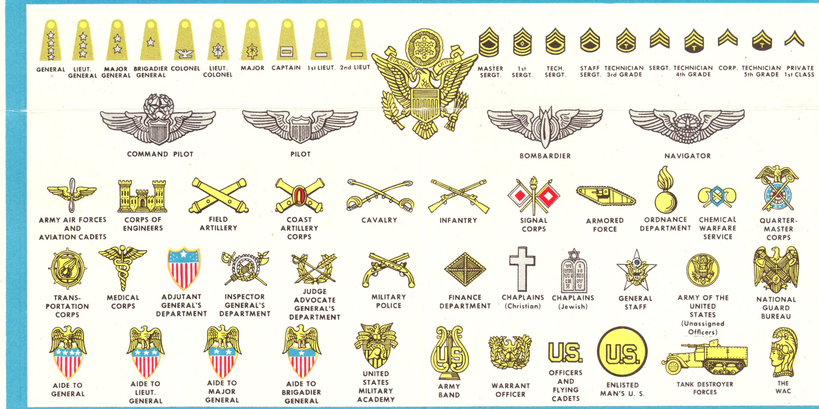


U. S. NAVY INSIGNIA



U. S. MARINE CORPS INSIGNIA

U. S. ARMY INSIGNIA



DIVISIONS CONTINUED

SERVICE COMMANDS

DEFENSE SECTORS & FRONTIERS

LITHO IN U. S. A.